

What is claimed is:

Claim 1: A method of measuring thickness of a film formed on a specimen, comprising the steps of:

- placing a predetermined point of said specimen at a measuring position;
- illuminating said predetermined point with light;
- detecting light reflected from said predetermined point by the illumination;
- determining from the detected light whether or not a thickness measurement of said film formed on said predetermined point is possible;
- measuring the thickness of said film formed on said predetermined point of said specimen, when the thickness measurement is determined possible;
- measuring a thickness of said film formed on a position around said predetermined point when the thickness measurement is determined impossible; and
- outputting information of thickness distribution of said film formed on said specimen,

wherein said position around said predetermined point is measured using information of a spectral distribution waveform of the reflected light from several points in the vicinity of said predetermined point.

Claim 2: A method according to claim 1, wherein said specimen is a semiconductor wafer on which a plurality of chips are formed and said predetermined point is inside one of said plurality of chips.

Claim 3: A method according to claim 1, wherein a possibility of the thickness measurement of said film is determined from characteristics of a spectral distribution waveform of the reflected light from said predetermined point.

Claim 4: A method according to claim 3, wherein said characteristics of a spectral distribution waveform includes at least one of a value of a specific peak of said spectral distribution waveform, spectrum analyzed data of said spectral distribution waveform, a position or magnitude of a specific frequency range of said spectral distribution waveform and a surface area factor in a visual field.

Claim 5: A method of measuring thickness of a film formed on a specimen, comprising the steps of:

- illuminating a measuring point on a specimen on which a pattern is formed and is covered with a film with light;
- detecting light reflected from a surface of film formed on said specimen and light reflected from a surface of said pattern covered with said film;
- determining from a spectral distribution waveform of the reflected light whether or not a thickness measurement of said film formed on said measuring point is possible;
- searching for another measuring point by detecting light reflected from a point around said measuring point when said measuring point is determined impossible during the thickness measurement of said film;
- measuring a thickness of said film formed on said another measuring point;
- and

outputting information of a thickness distribution of said film on said specimen.

Claim 6: A method according to claim 5, wherein said specimen is a semiconductor wafer on which a plurality of chips are formed and said predetermined point is inside one of said plurality of chips.

Claim 7: A method according to claim 5, wherein a possibility of the thickness measurement of said film is determined from characteristics of a spectral distribution waveform of the reflected light from said predetermined point.

Claim 8: A method according to claim 7, wherein said characteristics of a spectral distribution waveform includes at least one of a value of a specific peak of said waveform, spectrum analyzed data of said waveform, a position or magnitude of a specific frequency range of said waveform and a surface area factor in a visual field.

Claim 9: A method according to claim 5, wherein the thickness of said film is measured by calculating based on a frequency and a phase of a spectral distribution waveform of the reflected light.

Claim 10: A method according to claim 5, wherein the thickness of said film is measured by fitting a spectral distribution waveform derived from a structural model of said film and said pattern to a spectral distribution waveform of the reflected light.